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Maurice-Stam, H.; Grootenhuis, M.A.; Brons, P.P.; Caron, H.N.; Last, B.F.

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Psychosocial Indicators of Health-Related Quality of Life in Children With Cancer 2 Months After End of Successful Treatment

Heleen Maurice-Stam, MSc, Martha A. Grootenhuis, PhD,* Paul P. T. Brons, MD, PhD,† Huib N. Caron, PhD, MD,‡ and Bob F. Last, PhD**

Summary: The purpose of the study was to identify psychosocial correlates of Health-Related Quality of Life (HRQoL) in pediatric cancer patients after completion of cancer treatment. Multiple regression analyses were performed to predict self-reported HRQoL of 52 patients aged 8 to 15 years, and parent-reported HRQoL of 54 patients aged 1 to 5 years. Cognitive coping, family functioning, parental emotional reactions, communication about the disease, and several medical variables were included in the regression models. Better HRQoL was especially associated with more positive expectations of the further course of the disease and less frequent parental asking after disease-related emotions of the child. Interventions should include "positive thinking" as a coping strategy. Several other psychosocial variables were indicative of better HRQoL but further research is needed to confirm and to understand the relationship between psychosocial variables and HRQoL.

Key Words: childhood cancer, adaptation, coping, family system

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Dealing with childhood cancer is a dramatic event that could influence psychosocial functioning for a long time. An increasing number of studies have been directed at assessing Health-Related Quality of Life (HRQoL) in long-term survivors of childhood cancer because of the enormous increase in the number of survivors of childhood cancer reaching adulthood over the last decades.[1–3] Much less attention has been paid to HRQoL of young patients and to patients' functioning in the time surrounding coming off treatment, which is a very difficult and anxious time for both patients and parents. Families have to integrate their experiences in normal daily life and have to get used to living with the uncertainty about the recurrence of the disease and possible long-term side effects. Recently, the authors found that 2 months after the end of successful cancer treatment, pediatric patients aged 1 to 15 years and their parents experienced worse HRQoL than the general population to a clinically relevant extent.[4] The next logical step is to investigate which patients are at risk for worse HRQoL. Coming off therapy is one of the major transitions in care in the practice of pediatric oncology and, therefore, deserves special consideration.[5] Healthcare providers should understand the emotional reactions and ways of adjustment of the patients to provide optimal support.

Little is known about determinants of HRQoL in pediatric cancer patients shortly after the end of treatment. However, older age at diagnosis, longer time off treatment, irradiation therapy, and severe medical late effects turned out to be associated with worse HRQoL in pediatric long-term survivors of childhood cancer (see review of Stam et al[3]).

The predictors of HRQoL mentioned before concern medical and demographic factors. However, we are most interested in psychosocial predictors of HRQoL because these factors could be susceptible to modification. In imitation of conceptual frameworks used to explain adjustment in pediatric patients,[6] we presume that HRQoL is the outcome of a process over time that is influenced by demographic and medical variables and by psychosocial variables such as coping and family functioning. The psychosocial variables mediate the effect of the disease (the stressor) on an individual's well-being (Fig. 1). The psychosocial variables from the model are discussed below: coping, family functioning, parental emotional functioning, and communication.

According to the model of stress and coping developed by Lazarus and Folkman,[7] coping consists of actions, behaviors, and thoughts aimed at dealing with the demands of events and situations that are appraised as stressful. In the context of coping with cancer Grootenhuis et al[8] found the following cognitive control strategies to be relevant in the medical setting: expectations of the further course of the disease (predictive coping), relying on powerful others such as doctors (vicarious control), associating with chance, such as hoping for a miracle or wishful thinking (illusory control),

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From the *Pediatric Psychosocial Department; ‡Department of Pediatric Oncology, Emma Children's Hospital, Academic Medical Center, University of Amsterdam; and †Radboud University Nijmegen Medical Center, The Netherlands.
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Reprints: Heleen Maurice-Stam, MSc, Department of Pediatric Psychosocial, Emma Children's Hospital, Academic Medical Center, University of Amsterdam, Meibergdreef 9, NL-1105 AZ Amsterdam, The Netherlands (e-mail: h.stam@amc.uva.nl).

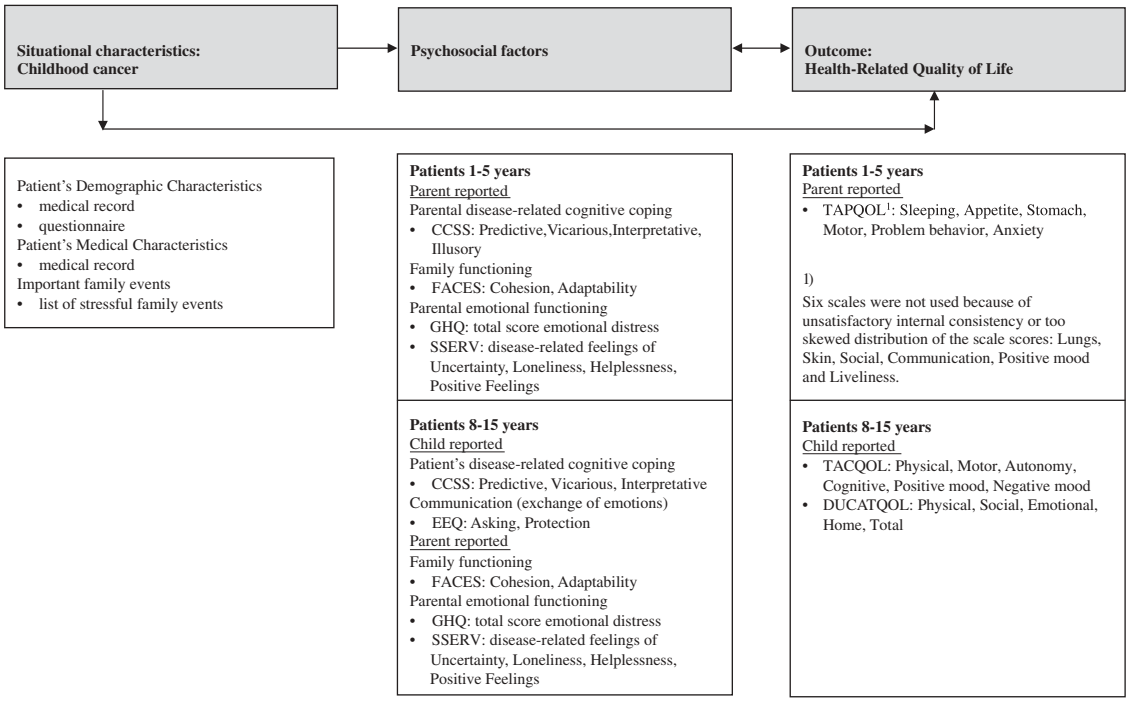

FIGURE 1. Research model with the domains of the questionnaires used.

and searching for information (interpretative control). Positive expectations about the further course of the disease (predictive coping) proved to be correlated with better quality of life, independent of the health status of the survivors.[9] Landolt et al[10] found that pediatric patients tend to prefer strategies that include cognitive and behavioral activities of avoidance. Similar results were found among pediatric cancer patients in remission[11] and among survivors of childhood cancer.[12] According to Phipps et al[13] children at cancer diagnosis showed a higher incidence of a repressive adaptive style than healthy children, and the incidence remained stable over time. Inconsistent results were reported about the impact of avoidant coping on survivors' adjustment.[13]

According to the family system theories, parental and family functioning influences the functioning in children and vice versa. Several studies on childhood cancer reported that parental emotional functioning was correlated with that of pediatric patients but it was difficult to determine the direction of the correlation. In addition, the time points of the assessment varied from shortly after diagnosis to long time after termination of treatment.[3] Family adjustment to chronic pediatric diseases has often been investigated by means of cohesion and adaptability, 2 dimensions of the Circumplex model of marital and family systems.[14] In this theoretical framework moderate levels of cohesion and adaptability are considered to be related to the most favorable adjustment outcome in families faced with stress, whereas extreme levels of adaptation and cohesion were related to less adaptive functioning. More recent research by Olson[15] indicated that high scores on cohesion and adaptability are related to more functional family relationships. Although most studies on childhood cancer indicated that family functioning was within normal limits,[16–21] some found that survivors' parents were overly protective[22] and also less flexible than the parents of healthy children.[19] Other studies reported that the quality of family cohesion and adaptability were positively related to psychosocial outcome in survivors.[23–27]

Communication about the disease is another aspect of dealing with cancer. It involves the exchange of information about the disease, but also the exchange of emotions evoked by the situation. Open communication seemed to be the best policy as long as the facts about the illness are involved. Openly informing the child about the disease and the implications seemed to be related positively to the child's psychosocial adjustment.[28–30] Avoidance of communication about the seriousness of the illness and about the emotional experience of the illness reflects a common defense reaction to a painful event, that could be a protective mechanism.[31] Van Veldhuizen and Last[32] found that children and parents used a typical, protective coping strategy, which they called the phenomenon of *double protection*. Children and their parents avoid communication about the emotional experience of cancer, not only to protect themselves against disease-related stress, but also against painful confrontations with the unpleasant emotions in the other. An area of tension always exists between the need to control the situation by double protection and the need to share emotions with the other person.

The aim of this paper is to investigate to what extent psychosocial factors as shown in Figure 1 are associated

with HRQoL in childhood cancer patients a few months after the end of successful cancer treatment. Identification of these factors will enable care-providers to provide optimal support to patients and their parents. The associations between the independent psychosocial variables and HRQoL outcomes (dependent variables) were controlled for effects of age, sex, medical variables, and stressful family events other than the cancer. We hypothesized that having more positive expectations of the further course of the disease (predictive coping), and better parental emotional functioning were correlated with better HRQoL. Furthermore, we explored the relation between HRQoL and (1) cognitive coping strategies other than predictive coping, (2) family functioning, and (3) the exchange of disease-related emotions (communication).

METHODS

Procedure

The results presented here concern the first measurement of the longitudinal Vragenlijsten kinderOncologie Latere Gevolgen (VOLG)-study, a Dutch study on the late psychosocial consequences of cancer in childhood. It started in 2000 and ended in 2006. The respondents were recruited from the The Emma Children's Hospital/Academic Medical Center in Amsterdam (from March 2000 until the end of 2002) and the Radboud University Nijmegen Medical Center (from June 2002 until the end of 2002). All consecutive patients who met the inclusion criteria were approached for the VOLG-study. Inclusion criteria were (1) aged 1 to 18 years, (2) complete remission, (3) end of successful treatment at most 2 months before, and (4) being able to complete Dutch questionnaires.

Parents of children with cancer and children with cancer aged 8 years or older were informed about the VOLG-study by letter. After informed consent was obtained, the parents were telephoned and an appointment was made for completion of questionnaires anonymously in the hospital or at home. The researcher assigned the questionnaire about HRQoL of preschool patients at random to the father or the mother. The parent to whom the questionnaire was assigned completed the questionnaire at each measurement occasion. The children and parents were instructed to complete the questionnaires independently. The assistance of the researcher was restricted to reading out questions aloud and to explaining the meaning of difficult words. Some parents and some patients aged 15 years or older filled in the questionnaires at home, without the assistance of the researcher. The respondents were asked to complete the questionnaires yearly, 4 to 6 times, depending on the year of inclusion. The results of the first assessment were used in this paper. Neither the self-reports of the patients aged 16 years or older nor the parent reports of patients aged 6 to 7 years were included in this paper because of the small number of patients in these age groups.

It was possible to gather medical information from the respondents and from the nonrespondents. The Medical Ethics Committee of the Academic Medical Center in Amsterdam and the Radboud University Nijmegen Medical Center has approved the study protocol.

Measures

Dependent Variables: HRQoL (Fig. 1)

The *TNO-AZL Preschool Quality of Life* questionnaire for children aged 1 to 5 years (*TAPQOL*),[33,34] and the *TNO-AZL Children's Quality of Life questionnaire* Child Form for children aged 8 to 15 years (*TACQOL*)[35,36] are generic Dutch instruments that measure HRQoL on group level in a reliable and valid way.[33–39] The questionnaires measure health status problems weighted by the impact of the problems on well-being. Most of the items consist of 2 questions linked to one another. The first one is about the frequency of the problem in the past few weeks. The second one rates the possible negative emotional responses to the problems on a 4-point Likert scale. The items are clustered into multi-item scales with higher scores indicating better HRQoL. Norm data from the general Dutch population are available.

The *TAPQOL* assesses the child's functioning on 12 domains: sleeping, appetite, lungs, stomach, skin, motor functioning, social functioning, problem behavior, communication, anxiety, positive mood, and liveliness. The Cronbach α's in our study population were moderate to good (0.67 to 0.97) with the exception of Skin (Cronbach $\alpha < 0.60$). This scale was not used in the analyses. The *TACQOL* assesses functioning on 7 domains: physical complaints, motor functioning, autonomy, cognitive functioning, social functioning, positive emotions, and negative emotions. The Cronbach α's in our study population were moderate to good (0.66 to 0.85) with the exception of Social Functioning (Cronbach $\alpha < 0.60$). This scale was not used in the analyses.

The *Dutch Children's AZL/TNO Quality of life Questionnaire (DUCATQOL)*[40] measures quality of daily functioning, an aspect of HRQoL, in patient aged 8 to 15 years. The 25 items, scored on a 5-point Likert scale are clustered into a total score and 4 domains: family functioning, bodily functioning, emotional functioning, and social functioning. Higher scores represent better HRQoL. The DUCATQOL is reported to be internally consistent and reproducible.[40,41] The Cronbach α's in the present study were satisfactory, ranging from 0.73 to 0.92.

Independent Variables: Psychosocial Factors (Fig. 1)

Disease-related cognitive coping was assessed with the *Cognitive Control Strategies Scale* (*CCSS*) for parents (*PF*) and patients (*CF*). The instrument, on the basis of the model of Rothbaum et al,[42] was developed at the Psychosocial Department of the Emma Children's Hospital/AMC. It assesses to what extent respondents try to gain sense of control over the illness by using cognitive coping strategies, measured on a 4-point Likert scale.

Higher scores represent a stronger reliance upon the control strategy. Scales were composed by means of principal component factor analysis with varimax rotation and reliability. The questionnaire proved to be useful in earlier studies.[4,8,41,43,44] The 25 items of the *CCSS-PF* were grouped into 4 scales: predictive control (being optimistic about the course of the disease), vicarious control (attributing power to medical care-givers and treatment), interpretative control (searching for information to better understand emotional reactions and to gain insight into the situation), and illusory control (attempts to influence the chance-determined outcome). The Cronbach α's in the present study were satisfactory, ranging from 0.63 to 0.83. The 22 items of the *CCSS-CF* were grouped into 3 scales: predictive, vicarious, and interpretative control. The Cronbach α's in the present study were satisfactory, ranging from 0.69 to 0.83.

Family functioning as perceived by the parents was measured with the Dutch version of the *Family Adaptability and Cohesion Evaluation Scales* (*FACES*)[45] developed by Olson et al.[46–48] The Adaptation scale (13 items) refers to the level to which a family adapts its power structure, role definitions, and rules according to internal and external demands. The Cohesion scale (23 items) refers to mutual connectedness among family members. Items are scored on a 4-point Likert scale. Internal consistency of the Dutch version is good though in the present study Cronbach α's were moderate, ranging from 0.57 to 0.69.

Parental emotional functioning was measured with the General Health Questionnaire-30 (GHQ-30) and the Situation Specific Emotional Reaction Questionnaire (SSERQ). The *GHQ*[49,50] is a 30-item self-report measure. The raw total scale score can be used as an overall index of psychologic distress with higher scores indicating more distress. The validity of the 30-item version is well documented and internal consistency is highly satisfactory.[49] Cronbach α in the current study was high ($\alpha = 0.92$).

The *SSERQ*, developed at the Psychosocial Department of the Emma Children's Hospital/AMC,[51] consists of 30 items divided in 4 subscales which describe feelings that can be considered situation specific for parents of children with cancer.[51] It concerns feeling of loneliness, helplessness, uncertainty, and positive feelings, which are assessed on a 4-point Likert scale. The higher the scores the more often parents experienced the emotional reactions. The validity and reliability turned out to be satisfactory in former studies.[41,51] The Cronbach α's in the current study were also satisfactory, ranging from 0.71 to 0.85.

Communication about the disease was measured with the *Exchange of Emotions Questionnaire (EEQ)*, recently developed at the Psychosocial Department of the Emma Children's Hospital/AMC. It is a questionnaire for children (*CF*) and parents (*PF*) that consists of 2 scales. The Child Form was used in the current study. The scale Asking contains 3 items about the frequency the parent asks after disease-related emotions of their child, for example, "How often did your father or mother ask whether you were sad about your disease." The scale Protection (PF) contains 6 items about the frequency of masking disease-related emotions, for example, "I tried to keep a firm attitude with my father or mother" or "When I was worried about my disease, I tried not to show that to my father or mother." The answers are scored on a 4-point Likert scale. Higher scale scores indicate more exchange of disease-related emotions. The internal consistency of the scales was satisfactory in the present study; Cronbach α 0.81 and 0.80 for Asking and Protection, respectively.

Independent Variables: Situational Characteristics (Fig. 1)

Important family events that occurred in the last year were rated by the parents on a list of 19 stressful family events, such as birth of a child, parental divorce, moving, death of a family member or friend, decline in financial means, change of school, change of job. A total score of family events was computed. The scores were then dichotomized on the basis of the presence or absence of at least 2 life events.

Medical data were obtained from the medical record of the patient. Prognosis was based on the survival chances at diagnosis as rated by each patient's oncologist, that is $< 25\%$, 25% to 75%, $> 75\%$. The patients and parents were asked to rate their perception of the intensiveness of the treatment for childhood cancer on a Visual Analogue Scale, from "totally nonintensive" (0, left end of line) to "very intensive" (10, right end of line). The parents were also asked to assess the visible consequences of the disease. Their answers were dichotomized to "presence" or "absence" of visible consequences.

Statistical Analyses

The Statistical Package for Social Sciences (SPSS), Windows version 11.5, was used for all analyses. Before conducting the final analyses, dichotomizing of some variables was needed because of the small number of patients in one or more of the categories (Table 1). Diagnosis, treatment, and prognosis were dichotomized as follows: leukemia/lymphoma (yes or no), chemotherapy and radiotherapy with/without surgery (yes or no), prognosis $> 75\%$ (yes or no).

Multiple regression analyses were performed to predict HRQoL as expressed by the scores on the TAPQOL (patients aged 1 to 5 y), the TACQOL and the DUCATQOL (patients aged 8 to 15 y) (Fig. 1). Linear regression models of the Social scale of the TACQOL, and Lungs, Skin, Social, Communication, Positive mood, and Liveliness of the TAPQOL could not be fitted because of unsatisfactory internal consistency or too skewed distribution of the scale scores (strong ceiling effect). Owing to the limited sample size we had to select independent variables beforehand. For the final regression analyses we selected variables that proved to be associated with HRQoL ($P < 0.15$) in one of the following

TABLE 1. Demographic and Medical Characteristics VOLG-study

	Participants				Nonparticipants			
	M	SD	Range	N	M	SD	Range	N
Age at study (y)	7.9	4.5	1.1-15.9	106	7.9	4.7	1.7-15.0	25
Age at first diagnosis (y)	6.7	4.6	0.3-15.2	106	7.5	5.2	0.6-14.7	24
Time since first diagnosis (mo)	13.7	8.2	2.0-29.7	106	—	—	—	—
Time since end of treatment (mo)	2.2	1.0	0.1-5.7	106	—	—	—	—
Duration of treatment (mo)	11.5	8.4	1.2-25.9	106	10.6	8.6	0.5-25.9	24
		%		N		%		N
Age categories								
1-5 y		50.9		54		48.0		12
8-15 y		49.1		52		52.0		3
Sex (female)		42.5		45		36.0		9
Diagnosis								
Leukemia/lymphoma		45.3		48		44.0		11
Solid tumor		50.9		54		48.0		12
Brain tumor		3.8		4		8.0		2
Prognosis								
< 25%		5.7		6		8.3		2
25%-75%		40.6		43		29.2		7
> 75%		53.8		57		62.5		15
Treatment*								
Chemotherapy		95.3		101		87.5		21
Radiotherapy		21.7		23		20.8		5
Surgery		47.2		50		54.2		13
Autologous bone marrow transplantation		1.9		2		4.2		1
Other		2.8		3		4.2		1

*More than one answer was possible per patient.

regression models: (1) age and sex; (2) diagnosis, treatment, prognosis; (3) duration of treatment, time since end of treatment, perceived treatment intensity, visible consequences of disease and treatment; (4) cognitive coping strategies, (5) family functioning, important family events, parental emotional distress, exchange of disease-related emotions (only in patients aged 8 to 15 y), and (6) parental disease-related emotional reactions. Age at diagnosis was left out of analyses because it seemed to correlate too strongly with age at study. Figure 1 shows how variables were assessed in whom.

Because of the strong explorative nature of our study, priority is given to find phenomena that exist (avoiding type I errors) rather than correcting for multiple testing (avoiding type II errors). Therefore, a significance level $P < 0.05$ was used in combination with effect sizes of the standardized regression coefficients (β) > 0.25. According to Cohen[52] correlations of 0.1 were considered small, 0.3 medium and 0.5 large.

RESULTS

Participants

A total of 164 consecutive childhood cancer patients were approached for the longitudinal part of the VOLG-study; 150 patients from The Emma Children's Hospital AMC and 14 patients from the Radboud University Nijmegen Medical Center. The response rate was 81.7% (n = 134). Of the 30 families who did not participate, 9 did not want to be confronted with cancer any longer, 8 did not return the informed consent form, and 5 did not return the questionnaires. Other reasons of refusal were recurrence of the disease (n = 3), multiple family problems (n = 3), not being able to complete Dutch questionnaires (n = 2). No significant differences were found ($P < 0.1$ at t tests or χ^2 tests) between the participants and nonparticipants with respect to age, sex, and several medical variables (Table 1).

A total of 52 patients aged 8 to 15 years and 54 patients aged 1 to 5 years, represented by 35 mothers and 19 fathers, were included in the present study.

Psychosocial Indicators of HRQoL in Patients Aged 1 to 5 Years

The TAPQOL scale scores were explained reasonably well by the regression models, except Stomach and Problem behavior. The explained variances of the other scales ranged from 0.30 (Anxiety) to 0.52 (Appetite) (Table 2). Parents who used more interpretative coping strategies reported less problem behavior in their child ($\beta = 0.27$, $P < 0.05$). Higher scores on family adaptability and cohesion seemed to be associated with worse appetite and more anxiety, respectively ($\beta = -0.28$, $P < 0.05$; $\beta = -0.44$, $P < 0.01$). Finally, parents who experienced more disease-related positive feelings reported more problems related to their child's appetite and motor functioning ($\beta = -0.59$, $\beta = -0.49$; $P < 0.001$).

TABLE 2. Standardized Regression Coefficients β for the Relation Between HRQoL (TAPQOL)† of Patients Aged 1 to 5 Years and Psychosocial Variables‡, Corrected for Demographic and Medical Variables

	Sleeping β	Appetite β	Stomach β	Motor β	Problem Behavior β	Anxiety β
Age	0.36**	—	0.19	—	—	—
Chemo + radio with/without surgery	0.17	0.27*	—	—	—	—
Prognosis > 75%	—	0.15	—	—	−0.29*	—
Duration of treatment (mo)	—	—	—	−0.32*	—	—
Time since end of treatment (mo)	0.31*	—	0.30*	—	—	0.29*
Perceived treatment intensity	−0.16	−0.19	—	—	—	—
Parent reported						
Predictive control	—	—	—	0.17	—	—
Interpretative control	—	—	—	—	0.27*	—
Family functioning: adaptability	−0.19	−0.28*	—	—	—	—
Family functioning: cohesion	—	—	—	—	—	−0.44**
Emotional distress parent	—	−0.11	—	—	—	—
Disease-related feelings uncertainty	—	−0.20	—	—	—	—
Disease-related positive feelings	—	−0.59***	—	−0.49***	—	—
Disease-related feelings loneliness	—	—	—	—	−0.22	—
df	5;40	7;37	2;50	3;44	3;49	2;46
R^2	0.35**	0.52***	0.13*	0.35***	0.22**	0.30***

†Higher scores represent less problems, so better HRQoL.

‡Not selected from preanalyses: Sex, Leukemia/lymphoma, Visible consequences, Important family events, Vicarious and Illusory control, parental disease-related feelings of Helplessness.

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

Psychosocial Indicators of HRQoL in Patients Aged 8 to 15 Years

Self-reported HRQoL of the patients aged 8 to 15 years was predicted reasonably well by the regression models, except Cognitive functioning. The explained variance of the other scales ranged from 0.28 (Negative mood) to 0.56 (Physical daily functioning). HRQoL as measured with the TACQOL is presented in Table 3. Patients who reported that their parents asked more after their disease-related emotions experienced worse physical and cognitive functioning and stronger negative mood ($\beta = -0.26$, $\beta = -0.34$, $\beta = -0.33$; $P < 0.05$, respectively). In addition, patients of parents who reported more emotional distress, reported more physical problems ($\beta = -0.26$, $P < 0.05$).

TABLE 3. Standardized Regression Coefficients β for the Relation Between HRQoL (TACQOL)† of Patients Aged 8 to 15 Years and Psychosocial Variables‡, Corrected for Demographic and Medical Variables

	Physical β	Motor β	Autonomy β	Cognitive β	Positive Mood β	Negative Mood β
Age	−0.32*	−0.22	—	—	—	—
Sex (female)	−0.17	—	—	—	—	—
Chemo + radio with/without surgery	—	0.24	0.23	—	—	—
Prognosis > 75%	—	0.16	0.37*	—	—	—
Duration of treatment (mo)	—	0.06	−0.10	—	—	—
Perceived treatment intensity	—	—	—	—	0.50**	—
No visible consequences	—	—	0.15	—	0.40*	—
Important family events (≥ 2)	−0.22	−0.20	—	—	−0.30*	—
Child reported						
Predictive control	—	—	—	—	0.07	0.26
Vicarious control	—	—	—	—	−0.19	−0.24
Interpretative control	—	−0.17	−0.21	—	—	—
Exchange of emotions: asking§	−0.26*	−0.16	—	−0.34*	—	−0.33*
Exchange of emotions: protection§	—	—	—	—	0.24	—
Parent reported						
Emotional distress parent	−0.26*	—	—	—	—	—
Disease-related positive feelings	—	−0.12	—	—	—	—
Disease-related feelings loneliness	—	—	−0.17	—	—	−0.18
df	5;40	8;35	6;37	1;46	6;33	4;40
R^2	0.41**	0.34*	0.32*	0.12*	0.45**	0.28*

†Higher scores represent less problems, so better HRQoL.

‡Not selected from preanalyses: Leukaemia/lymphoma, Time since end of treatment, Family adaptability, Family cohesion, parental disease-related feelings of Uncertainty and Helplessness.

§Higher scores indicate more exchange of disease-related emotions, so less Protection and more Asking.

*$P < 0.05$; **$P < 0.01$.

TABLE 4. Standardized Regression Coefficients β for the Relation Between Daily Functioning (DUCATQOL)† of Patients Aged 8 to 15 Years and Psychosocial Variables‡, Corrected for Demographic and Medical Variables

	Physical β	Social β	Emotional β	Home β	Total β
Age	−0.55***	−0.47***	−0.37**	−0.23	−0.51***
Sex (female)	−0.07	—	—	−0.11	−0.05
Important family events (≥2)	—	—	—	—	—
Child reported					
Predictive control	0.33*	—	0.39**	0.21	0.35**
Vicarious control	0.01	0.31*	—	—	—
Exchange of emotions: asking§	−0.09	—	—	—	—
Parent reported					
Family functioning: cohesion	0.07	0.17	—	0.40**	0.18
df	6;39	3;42	2;45	4;41	4;41
R^2	0.56***	0.49***	0.33***	0.35**	0.53***

†Higher scores represent higher quality of daily functioning, so better HRQoL.

‡Not selected from preanalyses: all medical variables, Interpretative control, Exchange of emotions (Protection), Family adaptability, Parental emotional distress, all Parental disease-related feelings.

§Higher scores indicate more exchange of disease-related emotions, so more Asking.

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

Child-reported cognitive coping strategies seemed not to be associated significantly with TACQOL-scores.

Quality of daily functioning (DUCATQOL) is presented in Table 4. Patients who relied more on predictive control strategies reported better physical and emotional daily functioning (β = 0.33, $P < 0.05$; β = 0.39, $P < 0.01$), and those who used more vicarious control strategies reported better social functioning (β = 0.31, $P < 0.05$). Stronger cohesion in the family was found to correlate with more positive appraisal of the patient's functioning at home (β = 0.40, $P < 0.01$).

DISCUSSION

The present study was focused on psychosocial indicators of HRQoL in pediatric cancer patients shortly after termination of successful treatment. This period of coming off therapy is understudied and, as far as we know, psychosocial correlates of HRQoL in preschool children have hardly been studied before. Psychosocial indicators of pediatric HRQoL were investigated on average 2 months after the end of treatment, that is, at the transition from active treatment to "normal daily life."

Predictive coping, which means being optimistic about the further course of the disease, was hypothesized to correlate positively with HRQoL. This hypothesis was partly confirmed. The more optimistic patients (8 to 15 y) were about the further course of the disease the better they felt in daily life, in general, emotionally and with respect to their body. These findings were in line with the results among young adult long-term survivors of childhood cancer.[9] However, the question of causality "does optimism lead to better HRQoL, or vice versa" cannot be answered. Positive thinking could incline to avoidant coping. The impact of the latter coping style is not clear yet because inconsistent findings were reported. An avoidant coping style, consisting of distraction, blaming others, and wishful thinking was found to correlate positively with child depression and anxiety.[53] Phipps et al,[54,55] on the contrary, reported that pediatric oncology patients scored significantly lower on depression, anxiety, and PTSS, as well as higher on repressive coping.

Parental predictive coping seemed not to be associated with HRQoL in preschool patients, but parental interpretative coping did correlate with problem behavior in these patients. Probably parents who relied strongly on interpretative coping are inclined to either explain their child's behavior as a natural emotional reaction to the cancer experience, or search for information because of the problem behavior of their child. Furthermore, patient's vicarious coping seemed to be correlated to positive feelings about others (Social scale DUCATQOL).

Positive as well as negative correlations were found between family functioning and HRQoL. Patients (aged 8 to 15 y) from cohesive families seemed to feel better at home and about their parents than patients from less cohesive families. However, more cohesion seemed to correlate with greater anxiety in preschool patients. This result could suggest that the stronger the mutual involvement the more transmission of parental worries to the child, or, inversely, that patient's anxiety could put parents up to stronger connectedness with their child. Furthermore, stronger adaptability was correlated with less appetite, which could mean that preschool patients had less eating problems as family structure was more stable. This seems especially reasonable in the context of young children.

The impact of parental emotional adjustment on patient's HRQoL seemed limited. According to our hypothesis, we found parental emotional distress to be related negatively to physical HRQoL as reported by patients aged 8 to 15 years. It is plausible to assume that the more the child suffers from physical complaints the more distress the parent experiences. On the other hand, parents with high levels of distress could be inclined to

evaluate the health status of their child negative. Furthermore, parents who derived more positive feelings from the cancer experience reported worse appetite and worse motor functioning in their young child. Maybe the worse HRQoL of their child the more the parents need to derive positive feelings from the disease to keep it up. It is known that stressful events could generate positive affect, for instance labeling ordinary events with positive meaning and appraising stressful situations as challenges which can generate feelings of mastery and control.[56]

In several studies on childhood cancer, parental distress was found to be correlated with adjustment of the child.[3] However, most studies are not truly comparable with the present one because these concern patient's emotional adjustment instead of HRQoL and differed on the time of assessment.[21,22,57–59]

Interesting correlations were found between parental asking after their child's disease-related emotions, physical and cognitive functioning, and negative mood. Again, it is not possible to determine the direction of the correlation. Suffering from observable complaints, physically or emotionally, could stimulate parents to ask whether he or she feels. Inversely, children whose parents ask more often after their disease-related emotions will become more aware of their disease and the consequences, which could lead to a more negative evaluation of their health. We did not find any significant correlation between masking of disease-related emotions and HRQoL. This finding could indicate that masking disease-related emotions did not influence patients' well-being. Additional research should further explore the way children and parents communicate about disease-related facts and the degree to which it is predictive of HRQoL.

Although it was not the focus of the present study to investigate the impact of medical variables on HRQoL we should mention the following: Medical variables seemed not to correlate with patient's affective evaluation of their daily functioning as measured with the DUCATQOL (feelings about them, their parents and friends, and feelings about daily routines at home and at school), whereas typical health-related outcomes as measured with the TACQOL, such as complaints and limitations that patients experience, seemed not to correlate with cognitive coping. Comparable results were found among long-term survivors of childhood cancer, in whom the independent impact of cognitive coping on physical HRQoL was considerably lower than on the mental HRQoL.[9]

Limitations

This study revealed useful information about psychosocial indicators of HRQoL in pediatric cancer patients a few months after termination of successful treatment, though causality could not be established. Strength of the study was the inclusion of a large number of psychosocial variables, including cognitive coping, family functioning, parental emotional functioning, and exchange of disease-related emotions. A disadvantage of the large number of variables was that preselection of variables for the final regression analysis was necessary. Furthermore, though children with a bad prognosis (< 25%) or brain tumor were included, their number was too small to assess the impact of bad prognosis and brain tumor reliably.

Another issue for discussion concerns the model of coping used in the present study. Our model of coping was based on the models of Lazarus and Folkman[7] and Rothbaum et al,[42] whose theoretical framework was developed for adults. In the area of childhood cancer developmental considerations should be taken into account, because with growing cognitive ability children will employ other coping strategies. Though several studies indicated that cognitive coping is relevant to children[43,60–62] it is also known that behavioral and problem-solving strategies are more predominant in younger children.[11,63]

Another limitation concerns the measures used. First, the present study focused on HRQoL but of course there are other interesting aspects of patients' functioning, for instance posttraumatic stress, social skills, and educational achievement. It would be of utmost importance to investigate indicators of social functioning very thoroughly because previous studies indicated that pediatric survivors suffered from clinically significant social anxiety, had less friends and participated less in peer and school activities than controls.[64–68] Moreover, social development of young adult survivors of childhood cancer seemed to be hampered.[69] On the contrary, Reiter-Purtill et al[70] concluded that patients did not exhibit more social difficulties than their peers 2 years after diagnosis. Second, unfortunately, not all HRQoL scales could be used because of insufficient internal consistency or too skewed distribution of the scale scores. The latter indicates that the instruments are not sensitive and cancer specific. However, HRQoL-questionnaires translated and validated for young Dutch children, other than the TAPQOL, TACQOL, and DUCATQOL, were not available at the start of the VOLG-study. Third, the "proxy problem" in the assessment of HRQoL in the preschool patients should be mentioned. Because the parents evaluated the child's HRQoL and their own adjustment, the correlations we found did not represent the clear impact of parental emotional adjustment on patients' HRQoL. We were not able to differentiate between the impact of parental emotions on parental perception of their child's HRQoL and the impact on "real" patient's HRQoL. Finally, although the explained variances of the regression models of HRQoL were satisfactory, undoubtedly there were several potential predictors of patients' HRQoL we did not assess in the present study, such as parental posttraumatic stress.[57,71–74]

Nevertheless, the present study revealed several interesting psychosocial indicators of patients' HRQoL. Following patients over time is necessary to be able to predict long-term HRQoL to the cancer experience, and to test whether psychosocial variables really mediate the effect of cancer on HRQoL. These are the main purposes of the ongoing VOLG-study.

Clinical Implications

Though clear predictors of HRQoL cannot be established, some consistent correlations of medium to large effect sizes according to Cohen[52] were found between psychosocial factors and HRQoL. Positive expectations of the further course of the disease, less frequent parental asking after disease-related emotions of the child, and lower levels of family adaptability could be considered psychosocial indicators of a favorable HRQoL. These indicators of HRQoL could be useful in clinical practice. Interventions should preferably include "positive thinking" because being hopeful could protect patients and parents from negative emotions. In addition, giving attention to strengths of the patients, which survivors of childhood cancer undoubtedly have, can generate feelings of mastery and control. Psycho-educational support groups could be helpful because a group intervention offers possibilities for sharing of emotions and experiences, and for supporting and helping each other to deal with the cancer experience. The group could also be used for practising skills and developing positive cognitions that these patients need to integrate their experiences in normal daily life, for example, what to tell friends about the disease, how to deal with physical limitations in relation to activities with peers. Overall, there is evidence of effectiveness for psycho-educational interventions for children with chronic disease incorporating cognitive-behavioral techniques on variables such as self-efficacy and psychosocial well-being.[75,76] A pilot study on the effects of a social-skills training group among children treated for brain tumors showed improvements.[77] As far as we know, other effective group interventions directed at pediatric survivors of childhood cancer have not been published yet[78] but group interventions focused on long-term adolescent and adult survivors and/or the whole family, seemed to be promising.[79,80]

Interventions to improve HRQoL of pediatric patients should also be directed at the parents. Psycho-educational support groups as described above could also be helpful for parents. Support groups could help parents to integrate their experiences in normal daily life and facilitate living with the uncertainty about the recurrence of the disease and possible long-term side effects. Furthermore, support groups could be useful to educate parents about the various aspects of openness in communication about the disease, such as the phenomenon of *double protection*, which has already been discussed in the Introduction. Previous research revealed high levels of emotional distress in parents shortly after the end of their child's cancer.[4] However, further research is needed to generate specific instructions to improve the well-being of the child by supporting the parents.

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